SPECIFICATION

1. Title of Invention

Throwaway cutting tool

2. Claims

A throwaway cutting tool comprising a tool body, and a throwaway insert provided at tip of said tool body and having ultrahigh pressure sintered body, said throwaway insert being formed with a nose at its tip, a front cutting edge at one side of said nose, and a side cutting edge at the other side of said nose, said nose and said front cutting edge and said side cutting edge being each formed with a chamfer honing,
characterized in that a chamfer angle at said nose is equal to or larger than a chamfer angle at said side cutting edge and the chamfer angle at said side cutting edge is larger than a chamfer angle at said front cutting edge.

3. Detailed Description of Invention

[Technical Field]

The present invention relates to a throwaway cutting tool provided with a throwaway insert having ultrahigh pressure sintered body at tip of the tool body.

[Prior Art]

Heretofore, as such a cutting tool, a throwaway cutting tool 11 shown in Fig. 2 is known. The throwaway cutting tool 11 includes a tool body 12 which is formed with an insert seat 13 at its tip. To the seat 13, a throwaway insert 16 which has an insert 15 of ultrahigh pressure sintered body is brazed on a substrate 14 made of WC, WCo, etc. A nose 19 is formed at tip of an intersection between top face 17 and side face 18 of the throwaway insert. At one side of the nose 19, a front cutting edge 20 is formed. At the other side thereof, a side cutting edge 21 is formed.

The nose 19, front cutting edge 20 and side cutting edge 21 are formed with chamfer honings 19a, 20a and 21a, respectively. This is because ultrahigh sintered body is more brittle in comparison with cemented carbide and ceramics and is more liable to form chipping. The chamfer angle α of the chamfer honing 19a, chamfer angle β of the chamfer honing 20a, chamfer angle γ of the chamfer honing 21a are set so that $\alpha = \beta = \gamma$. Also, the chamfer honings 19a, 20a and 21a are formed so that their land widths will be about 0.1 mm.

[Problems That Have To Be Solved]

In recent years, in finishing hardened steel, Al-Si alloys and Ti alloys, cutting is used in place of grinding to increase the working efficiency. In cutting performed for such a purpose, depth of cut and feed are often as small as less than 0.1 mm. But, with such a throwaway cutting tool 11, in

cutting to such a micro depth of cut, the depth of cut tends to be smaller than the land width. Therefore, one problem was that chip ejection is so poor that the edge tip is liable to be clogged with chip and get chipped and the surface roughness of the work impairs.

If the chamfer angle is decreased to solve this problem, chipping can occur due to insufficient edge strength. On the other hand, if the chamfer angle is increased, the cutting resistance would increase, so that the workpiece or the insert would offset and good working accuracy could not be obtained.

[Means For Solving Problem]

This invention aims to solve this problem by forming so that a chamfer angle at the nose is equal to or larger than a chamfer angle at the side cutting edge and the chamfer angle at the side cutting edge is larger than a chamfer angle at the front cutting edge.

[Function]

According to this invention, a chamfer angle at the nose is set to be equal to or larger than a chamfer angle at the side cutting edge and the chamfer angle at the side cutting edge is set to be larger than a chamfer angle at the front cutting edge. Therefore, it is possible to strengthen the nose at which a larger load is applied than at any other point, and prevent chipping. Also, it is possible to improve the cutting feel and the chip ejection of the front cutting edge, thus improving the finishing accuracy and the finished surface roughness. Further, it is possible to improve chip ejection of the side cutting edge and prevent the insert from chipping due to clogging of chip at edge tip. Thus, the throwaway cutting tool can improve chip ejection, prevent the cutting edge from chipping, and improve the finishing accuracy and the finished surface roughness.

[Embodiment]

Hereinbelow, one embodiment of this invention will be described with reference to Fig. 1. In Fig. 1 the same numerals are used for the same parts as the prior art tool and description will be omitted.

Fig. 1 shows a throwaway cutting tool 31 embodying this invention. With this tool 31, the chamfer angle α at the nose 19, the chamfer angle β at the front cutting edge 20 and the chamfer angle γ at the side cutting edge 21 are set so as to be $\alpha \geqq \gamma > \beta$. The chamfer angle α should be set to $15° \leqq \alpha \leqq 50°$. If α is less than $15°$, the tool strength would be insufficient, so that chipping is liable to occur. If α is more than $50°$, chattering or chipping can occur. The chamfer angle β should be set to $5° < \beta < 30°$ and the chamfer angle γ should be set to $5° < \gamma < 30°$. This is because if β and γ are less than $5°$, chipping is liable to occur and if β and γ are more than $30°$, the cutting tool is liable to clog with chip.

Further, the land width W of the chamfer honing 19a, 20a and 21a should be $0.03 \leqq W \leqq 0.5$. This is because if W is less than 0.03, the effect of chamfer honing would disappear and if W is more than 0.5, the cutting position by the cutting edge would be too low from the upper face 17 of the throwaway insert 16, so that good finished surface could not be obtained.

As described above, with the throwaway cutting tool 31, because the chamfer angle α at the nose 19, the chamfer angle β at the front cutting edge 20 and the chamfer angle γ at the side cutting edge 21 are set so as to be $\alpha \geqq \gamma > \beta$, it is possible to set large the negative rake angle at the nose 19 at which a larger load is applied than at any other point, and thus strengthen the cutting edge, and prevent chipping. Also, it is

possible to improve the cutting feel and the chip ejection, thus improving the finishing accuracy and the finished surface roughness. Further, it is possible to improve chip ejection and prevent the insert from chipping due to clogging of chip at edge tip. As described above, the throwaway cutting tool 31 can improve chip ejection, prevent the cutting edge from chipping, and improve the finishing accuracy and the finished surface roughness.

With the abovesaid embodiment, the intersection between the chamfer 19a, 20a and 21a and the side face 18 is formed to a sharp edge. But it is not limited, but the intersection may be subjected to round honing of R0.02 or less.

Also, although in the above embodiment the boundary between the chamfer honing 19a at the nose 19 and the chamfer honing 20a at the front cutting edge 20 and the boundary between the chamfer honing 19a at the nose 19 and the chamfer honing 21a at the side cutting edge 21 are connected non-continuously through ridge X and Y, respectively. But this is not limited thereto. The adjoining chamfer honings may be connected continuously smoothly.

[Effects of Invention]

According to this invention, a chamfer angle at the nose is set to be equal to or larger than a chamfer angle at the side cutting edge and the chamfer angle at the side cutting edge is set to be larger than a chamfer angle at the front cutting edge. Therefore, it is possible to improve the chip ejection and prevent the insert from chipping, and improve the finishing accuracy and the finished surface roughness.

4. Brief Description of Drawings

Fig. 1 is a perspective view of one embodiment of this invention, and

Fig. 2 is a perspective view of a prior art throwaway cutting tool.